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Re: Inquiry into Electricity Supply for Electric Vehicles

5) Whether old EV batteries could have a second life as household or community batteries after removal from vehicles

On paper, the idea of second-life EV batteries makes a lot of sense. When batteries are retired from vehicles they typically still retain around 70–80% of their original capacity, which could be valuable for stationary storage such as household or community batteries. However, in practice the challenges are significant. The first challenge is accurate diagnosis of battery state-of-health (SoH). Current diagnostic tools often produce results that can vary by 10–15%, which creates uncertainty about the remaining capacity, safety, and usable lifetime of repurposed batteries. At scale, that uncertainty becomes a major barrier to reliable deployment.

The second challenge is safe disassembly and repackaging. EV battery packs were not originally designed with second-life applications in mind. Different manufacturers use different cell formats, geometries, cooling systems, and packaging architectures, which means there is unlikely to be a universal disassembly or repurposing pathway. Each design requires its own specialised approach, which increases cost and complexity.

A third barrier is insurance and bankability. Even if the technical challenges are addressed, large-scale deployment will depend on whether insurers and investors are willing to underwrite these systems. Without standardised testing, certification, and liability frameworks, insurance companies are unlikely to support widespread second-life deployment.

That said, this is precisely an area where targeted innovation can make a difference. Universities and research organisations can play a critical role in developing better diagnostics, safer repurposing technologies, and standards for battery grading. Targeted funding schemes that enable close collaboration between researchers, policymakers, and industry will be essential to translate these ideas into practical and scalable solutions.

Second-life batteries are not simply a technical problem; they are a systems problem involving diagnostics, safety, insurance, and regulation, and solving it will require coordinated innovation between research institutions, industry, and government.

(6) The barriers and opportunities to the manufacture, reconditioning and recycling of EV batteries, or other elements of the EV supply chain, in Victoria

Victoria is well positioned to participate in the EV battery value chain because it has strong research capability, advanced manufacturing expertise, and an innovation ecosystem centred around universities and technology institutes. However, the EV battery landscape is evolving very rapidly, and this creates strategic challenges for recycling and reconditioning infrastructure.

Historically, recycling economics were driven largely by nickel and cobalt in high-nickel chemistries such as NMC and NCA. But the global market is shifting toward lithium-iron-phosphate (LFP) batteries, particularly for mass-market electric vehicles. These batteries contain fewer high-value metals, which fundamentally changes the economics of recycling.

Our internal research at RMIT, supported by the AEA Ignite program through the Digital Battery Passport project, suggests that Australia's EV battery chemistry landscape is likely to align more closely with China than with Europe or the United States, where LFP batteries dominate. This means recycling infrastructure needs to be designed for the batteries we will actually receive, not the batteries that historically drove recycling economics.

A second issue is material sovereignty and supply-chain timing. If local recycling capacity is not established at the right time, Australia may end up exporting battery "black mass" to countries such as China for processing. Then, when domestic recycling facilities eventually come online, they may face the opposite problem, having capacity but insufficient feedstock, a challenge already being observed in parts of the global recycling industry.

For that reason, investment should focus on adaptive and intelligent recycling platforms that can respond to the rapidly changing battery landscape. Battery chemistries, mineral prices, and recycling technologies are evolving quickly, so recycling infrastructure must be flexible rather than designed around a single chemistry or fixed process.

This is an area where universities should play a central role, working closely with industry and government to develop smart recycling systems that can adapt to changing battery compositions and supply chains. If we approach it strategically, Victoria has the opportunity to build a resilient and forward-looking battery recycling ecosystem, rather than replicating models that may already be becoming outdated elsewhere.

The EV battery sector is evolving so quickly that we should not just build facilities, we should build adaptive systems supported by research, policy, and industry working together.